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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PU040276	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/US2004/033712	International filing date (day/month/year) 12.10.2004	Priority date (day/month/year) 14.10.2003	
International Patent Classification (IPC) or national classification and IPC H04N7/26			
Applicant THOMSON LICENSING et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 17.06.2005		Date of completion of this report 27.02.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840		Authorized Officer Heising, G Telephone No. +49 30 25901-407	



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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-17 as originally filed

Claims, Numbers

2-5, 7, 9, 10 as originally filed
1, 6, 8 filed with telefax on 17.06.2005

Claims, Pages

18, 19 filed with telefax on 17.06.2005

Drawings, Sheets

1/2, 2/2 received on 14.01.2005 with letter of 09.12.2004

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-10
	No: Claims	
Inventive step (IS)	Yes: Claims	2-5,7,8
	No: Claims	1,6,9,10
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V.

- 1 The following documents are referred to in this communication:

D1 : CHRISTINA GOMILA, ALEXANDER KOBILANSKY: "SEI message for film grain encoding" JVT OF ISO IEC MPEG AND ITU-T VCEG JVT-H022, 23 May 2003 (2003-05-23), pages 1-14, XP002308742 GENEVA, SWITZERLAND

D2 : CHRISTINA GOMILA: "SEI message for film grain encoding: syntax and results" JVT OF ISO IEC MPEG AND ITU-T VCEG JVT-I013 REVISION 2, 2 September 2003 (2003-09-02), pages 1-11, XP002308743 SAN DIEGO, CA, USA

D3: US-A-5 641 596 (GRAY ET AL) 24 June 1997 (1997-06-24)

D4: GISLE BRONTEGAARD: "Addition of comfort noise as post processing" ITU-T STUDY GROUP 16, VIDEO CODING EXPERTS GROUP, DOCUMENT Q15B15, 8 September 1997 (1997-09-08), pages 1-2, XP002319278 SUNRIVER, OREGON, USA

2 INDEPENDENT CLAIM 1

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

Document D1 discloses (the references in parenthesis applying to this document):

A method for reducing subjective artifacts in a video image, comprising the steps: receiving supplemental information that includes at least one parameter that specifies an attribute of comfort noise for addition to an image;

(D1: figure 1 with "SEI message with film grain parameters")

generating the temporally correlated noise; and adding such noise to the image at a level in accordance with the at least one parameter, to substantially hide artifacts.

(D1: page 5, lines 13-15 with equation 1 and page 6, equation 3, with noise $G(t)$ being correlated to the noise $G(t-1)$ of the previous image by temporal correlation factor v , and added to the decoded image $I(t)$. According to D1: page 4, paragraph 1, lines 3-7 the *level* is specified by the SEI parameters.)

The subject-matter of claim 1 therefore differs from this known D1 in that:

making a determination, in accordance with the at least one parameter, whether to add temporally correlated noise.

The problem to be solved by the present invention may therefore be regarded as:

Adding the noise only to those image signals where it is needed.

D1 models the original film grain that was in the images before encoding. Thus, it is clear that the model must also reflect the case where no film grain was in the image or in an image signal component. This is for example the case, when 1) images were produced by CCD cameras instead of motion picture film cameras, or 2) when the film grain is monochromatic, i.e. not present in all colour components.

For the first example, it is not clear from D1 how the addition of noise is switched off, but since only the encoder may know about the presence of film grain in the original images, it is obvious that only the encoder can pass the information about on/off switching of noise addition at the decoder by transmitting respective parameters. Furthermore, regarding the second example of monochromatic noise, on page 9, lines 8-10, D1 uses only the noise of the luminance component not the noise of the two other colour components. Since this decision is based on the model, and since the model is controlled by the received parameters it is obvious for the skilled person that a decision whether to add the noise to an image signal or not is based on the received image parameters.

Therefore, the skilled person would regard it a normal design procedure to combine all the features set out in claim 1.

3 INDEPENDENT CLAIM 6

Claim 6 is the corresponding apparatus claim to the above method claim 1. It is to be observed that each means of the apparatus is perfectly matching to one corresponding technical feature of the method claim. For the same reasons as given in section 2 above this corresponding apparatus claim 6 does not meet the criteria of

Article 33(1) PCT, because the subject-matter of claim 6 does not involve an inventive step in the sense of Article 33(3) PCT.

4 DEPENDENT CLAIMS 9 AND 10

Dependent claims 9 and 10 do not contain any features which, in combination with the features of claim 6 to which they refer, meet the requirements of the PCT in respect of inventive step, see document D1 and the inventive step reasoning for the monochromatic example in section 2 of this report.

5 DEPENDENT CLAIMS 2-5 AND 7-8

The combination of the features of dependent claims 2-5 and claims 7-8 are neither known from, nor rendered obvious by, the available prior art. The reasons are as follows:

Claim 2 (and claim 7) comprises the feature of "accessing a look-up table using the block pixel average and picture quantization parameters to obtain weights of temporal correlation factors for weighting the added noise". D1 discloses the principle of temporally correlating noise using a correlation factor v , but is quiet about how to adapt the correlation factor. D2 suggest to adapt the noise level to the block pixel average. D3 discloses the use of a look-up table to store spatial correlation factors (coefficients for noise generation). D4 discloses the adaptation of comfort noise intensity to the quantization parameter of the decoded image. But, since there is no hint to employ the block pixel average (D2) and the quantization factor (D4) to access a look-up table (D3) to obtain the weight of a temporal correlation factor (D1), it is not obvious for the person skilled in the art to combine these features in the way it is done in claim 2 (and claim 7).

Since claims 3-5 (and 8) depend on claim 2 (and claim 7, respectively) their subject-matter is as well novel and inventive.

6 CLAIMS 1-10

Claims 1-10 disclose methods and apparatus for video post-processing applications

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to reduce artifacts. Therefore, the subject-matter of these claims is considered to be industrially applicable according to Article 33 (4) PCT.

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CLAIMS

1 1. A method for reducing subjective artifacts in a video image, comprising the
2 steps of:
3 receiving supplemental information that includes at least one parameter that specifies
4 an attribute of comfort noise for addition to an image;
5 generating the temporally correlated noise; and
6 making a determination, in accordance with the at least one parameter, whether to add
7 temporally correlated noise, and if so, adding such noise to the image at a level in accordance
8 with the at least one parameter, to substantially hide artifacts.

1 2. The method according to claim 1 further comprising the step of generating the
2 temporally correlated noise by the steps of:
3 obtaining a block pixel average;
4 accessing a look-up table using the block pixel average and picture quantization
5 parameters to obtain weights of temporal correlation factors for weighting the added noise.

1 3. The method according to claim 2 wherein the step of accessing a look-up table
2 further comprises the step of accessing a look-up table containing Gaussian random numbers.

1 4. The method according to claim 2 wherein the step of adding temporally
2 correlated noise includes the step of adding temporally correlated noise to one of luma or
3 chroma pixels.

1 5. The method according to claim 4 further comprising the step of adding
2 temporally correlated noise includes adding noise to both luma and chroma pixels.

1 6. Apparatus for reducing subjective artifacts in a video image, comprising:
2 means for receiving supplemental information that includes at least one parameter that
3 specifies an attribute of comfort noise for addition to an image;
4 means for generating the temporally correlated noise; and

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5 means, responsive to the at least one parameter, for making a determination whether to
6 add temporally correlated noise, and if so for adding such noise to the image at a level in
7 accordance with the at least one parameter, to substantially hide artifacts.

1 7. The apparatus according to claim 6 further comprising:
2 means for obtaining a block pixel average;
3 means for accessing a look-up table using the block pixel average and picture
4 quantization parameters to obtain weights of temporal correlation factors for weighting the
5 added noise.

1 8. The apparatus according to claim 7 wherein the look up contains Gaussian
2 random numbers.

1 9. The apparatus according to claim 6 wherein the means for adding temporally
2 correlated noise adds temporally correlated noise to one of luma or chroma pixels.

1 10. The apparatus according to claim 9 wherein the means for adding temporally
2 correlated noise adds temporally correlated noise to both luma and chroma pixels.

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